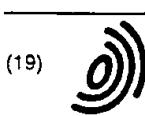


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## (54) A scheduler apparatus for use in a television receiver

(57) In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide listing, apparatus is provided for searching for specific television programs which satisfy certain criteria concerning a user's viewing preferences, and upon successful conclusion to the search, the apparatus gener-

ates a list of such television programs in order to predict for the viewer certain programs which may be of interest. In a first embodiment of the invention the apparatus stores information about the particular television shows which the user watches, as search criteria. In a second embodiment of the invention the search criteria is editable by the viewer to further refine the searches.

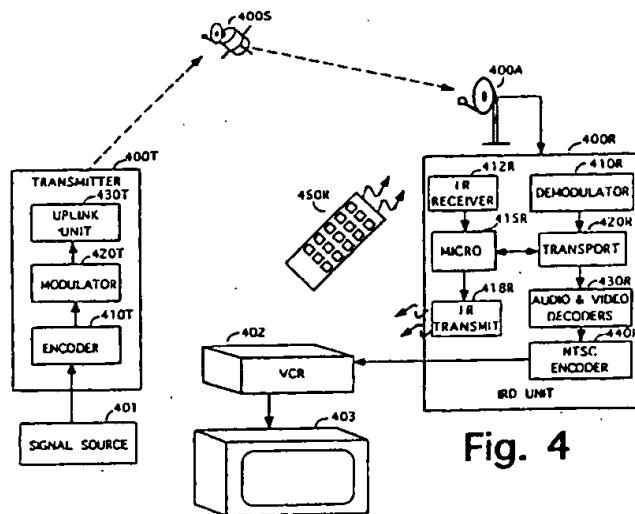


Fig. 4

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**Description**

The subject invention concerns apparatus for scheduling the selection of a television program for watching or recording at some future date.

The act of selecting a television program to watch has become more complicated in that the number of available channels has increased dramatically of late. For example RCA® DSS® direct broadcast satellite receivers provide as many as 150 channels to choose from. Heretofore, a user who wanted to see "what's on" could merely consult a television schedule printed in his local newspaper in the hope that he would eventually find a program which sparked his interest.

Such a practice may work well when there are only a few television channel schedules to examine, however, it is unlikely that a viewer would be able to examine the complete schedules for 150 television channels, just to see "what's on" at a given time. Such a task would be daunting even if all of the programs were to be listed by category. A viewer may find that there are only a few programs of interest to him out of the vast number of available programs. That is, the chaff outnumbers and tends to hide the wheat. Consequently, it is felt that as the number of channels increases, the chances of successfully locating a desirable program in a short time becomes more and more unlikely.

In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide listing, apparatus is provided for searching for specific television programs which satisfy certain criteria concerning a user's viewing preferences, and upon successful conclusion to the search, the apparatus generates a list of such television programs in order to predict for the viewer certain programs which may be of interest. In a first embodiment of the invention the apparatus stores information about the particular television shows which the user watches, as search criteria. In a second embodiment of the invention the search criteria is editable by the viewer to further refine the searches.

FIGURE 1 is an illustration of a screen display, in accordance with an aspect of the invention.

FIGURE 2 is an illustration of a screen display showing a viewed item list in accordance with another aspect of the invention.

FIGURE 3 is a flowchart useful in understanding the invention.

FIGURE 4 is an illustration in block diagram form of apparatus suitable for use with the invention.

FIGURE 5 is a flowchart useful in understanding the invention.

FIGURES 6a-6c are illustrations of screen displays produced in accordance with the invention.

Television systems such as the RCA® DSS® direct broadcast satellite system and Starsight® transmit channel guides for display on the television receivers of subscribers.

FIGURE 1 shows a Program Guide screen display 110 produced, for example, by an RCA® DSS® direct broadcast satellite receiver system, manufactured by Thomson Consumer Electronics, Inc. Indianapolis, IN.

- 5 A user selects a television program from a Program Guide for viewing, by moving a cursor (via operation of remote control up, down, right, and left, direction control keys, not shown) to a block of the program guide screen display which contains the name of the desired program.
- 10 When a SELECT key of the remote control is pressed, the current x and y position of the cursor is evaluated to derive virtual channel and program time information. In this example of FIGURE 1, a particular television show, CINE SATURDAY NIGHT MOVIE: ZULU has been highlighted for selection by use of the cursor keys on a remote control unit (e. g., 450R of FIGURE 4). The highlighting is illustrated by the dark box outlining the title in FIGURE 1. Normally, upon pressing the select key, the relevant programming data is transferred to a programming unit. Note also that an auxiliary text display 120 is shown. Auxiliary text display 120 provides additional data relating to the highlighted television program. A further use for the data provided by channel guide screen 110 and auxiliary text display 120 will be described below.
- 15
- 20
- 25

FIGURE 2 shows a "predictive agent list" or "viewed item list" which may be generated as a screen display 210. Data is automatically stored in this predictive agent list by the apparatus of the invention, whenever a program is watch for a given period of time, for example, 5 or more minutes. In this way, a record is kept of the user's viewing habits so that the apparatus can be guided to make a prediction of which upcoming shows may be of interest to the viewer.

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  - 45
  - 50
- A predictive agent list 210 is illustrated in FIGURE 2. In the example of FIGURE 2, the viewer has watched 7 movies. (The television program type "movies" is a broad classification known as a "topic"). The last movie was watched on 15 November 1995. Of these 7 movies there were three movies having the theme "comedy", and four movies having the theme "drama". The last comedy was watched on 15 November 1995, and the last drama was watched on 27 September 1995. The viewer also watched 21 episodes of a television program entitled "The Simpsons". Note that an indication of whether each item is locked or unlocked is also stored in the predictive agent list. A viewer may lock an item to prevent the system from automatically deleting that item, if that particular item has not been watched recently. Moreover, the user may edit the viewed item list in order to provide a better filter for the television programs to be predicted (see FIGURE 6c).

Automatic loading of the viewed item list is shown in the flowchart of FIGURE 3, wherein the routine is entered at step 300. At step 305, a check is made to see if the tuner has been tuned to the current channel for at least five minutes. If not, the routine is exited at step 310. If so, the routine advances to step 320 to get the

viewed item list from memory. At step 325, a check is made to see if an item matching the currently viewed television program already exists in the viewed item list. If so, the count of that item is incremented and the routine is exited at step 335. If an item matching the currently viewed television program does not already exist in the viewed item list, then the routine advances to step 340. At step 340 a check is made to see if the list is full. If not, then data indicative of the currently viewed television program is added to the viewed item list, and the routine is exited at step 335. If, at step 340, it was determined that the viewed item list was full, then at step 350 the routine will read the least recently viewed item of the list. At step 355, a check will be made to see if that item is locked. If so, it means that the viewer does not want that item to be deleted, and the routine loops back to step 360 to get the next least recently viewed item from the list. That item will in turn be checked at step 355 to see if it is locked. If not, the routine will advance to step 365 where that item will be deleted to provide free space in the list. The routine will then advance to step 345, add the new item to the list, and exit at step 335.

A viewer may request a search to see "what's on" at any given time (see FIGURE 6a). The result of that search will be a list of predictions of television programs which the user might find interesting. Such a list of predictions will be displayed to the user by means of an on-screen display (see FIGURE 6b). The displayed list may be presented in a "weighted" fashion, for example in descending order of the number of times that a particular type of show was watched. Generation of this list of predictions is shown in the flowchart of FIGURE 5.

As noted above, the channel guide data used by the controller of the subject apparatus to form the above-described interactive or confirmation sentences may be received from a satellite television communication system. FIGURE 4 shows such a satellite television communication system in which, a satellite 400S receives a signal representing audio, video, or data information from an earth-based transmitter 400T. The satellite amplifies and rebroadcasts this signal to a plurality of receivers 400R, located at the residences of consumers, via transponders operating at specified frequencies and having given bandwidths. Such a system includes an uplink transmitting portion (earth to satellite), an earth-orbiting satellite receiving and transmitting unit, and a downlink portion (satellite to earth) including a receiver located at the user's residence.

In such a satellite system, the information necessary to select a given television program is not fixedly programmed into each receiver but is rather is downloaded from the satellite continually on each transponder. The television program selection information comprises a set of data known as a Master Program Guide (MPG), which relates television program titles, their start and end times, a virtual channel number to be displayed to the user, and information allocating virtual channels

to transponder frequencies and to a position in the time-multiplexed data stream transmitted by a particular transponder. In such a system, it is not possible to tune any channel until the first master program guide is received from the satellite, because the receiver (IRD, or Integrated Receiver Decoder) literally does not know where any channel is located, in terms of frequency and position (i.e. data time slot) within the data stream of any transponder.

10 A master program guide is preferably transmitted on all transponders with the television program video and audio data, and is repeated periodically, for example, every 2 seconds. The master program guide, once received, is maintained in a memory unit in the receiver, and updated periodically, for example every 30 minutes. Retention of the master program guide allows instantaneous television program selection because the necessary selection data are always available. If the master program guide were to be discarded after using it to select a television program, then a delay of at least two seconds would be incurred while a new program guide was acquired, before any further television program selections could be performed.

25 Once the channel transponder carrying a desired television program is tuned, the data packets containing the audio and video information for that program can be selected from the data stream received from the transponder by examining the data packets for the proper SCID (Service Component Identifier) 12 bit code. If the SCID of the currently received data packet matches the SCID of the desired television program as listed in the program guide, then the data packet is routed to the proper data processing sections of the receiver. If the SCID of a particular packet does not match the SCID of the desired television program as listed in the program guide, then that data packet is discarded.

30 A brief description of system hardware, suitable for implementing the above-described invention, now follows. In FIGURE 4, a transmitter 400T processes a data signal from a source 401 (e.g., a television signal source) and transmits it to a satellite 400S which receives and rebroadcasts the signal to a receiving antenna 400A which applies the signal to a receiver 400R. Transmitter 400T includes an encoder 410T, a modulator (i.e., modulator/forward error corrector (FEC)) 420T, and an uplink unit 430T. Encoder 410T compresses and encodes signals from source 401 according to a predetermined standard such as MPEG. MPEG is an international standard developed by the Moving Picture Expert Group of the International Standards Organization for coded representation of moving pictures and associated audio stored on digital storage medium. An encoded signal from unit 410T is supplied to modulator/Forward Error Corrector (FEC) 420T, which encodes the signal with error correction data, and Quaternary Phase Shift Key (QPSK) modulates the encoded signal onto a carrier.

35 Uplink unit 430T transmits the compressed and encoded signal to satellite 400S, which broadcasts the sig-

nal to a selected geographic reception area. The signal from satellite 400S is received by an antenna dish 400A coupled to an input of a so-called set-top receiver 400R (i.e., an interface device situated atop a television receiver). Receiver 400R includes a demodulator (demodulator/Forward Error Correction (FEC) decoder) 410R to demodulate the signal and to decode the error correction data, an IR receiver 412 for receiving IR remote control commands, a microprocessor 415R, which operates interactively with demodulator/FEC unit 410R, and a transport unit 420R to transport the signal to an appropriate decoder 430R within unit 400R depending on the content of the signal, i.e., audio or video information. An NTSC Encoder 440R encodes the decoded signal to a format suitable for use by signal processing circuits in a standard NTSC consumer VCR 402 and standard NTSC consumer television receiver 403. Microprocessor (or microcontroller, or microcomputer) 415R receives infrared (IR) control signals from remote control unit 450R, and sends control information to VCR 402 via an IR link 418R. Microprocessor 415R also generates the on-screen display (OSD) signals needed for presenting the interactive sentence, or confirmation sentence, to the user. Microprocessor 415R also receives and interprets cursor key X and Y information in order to control the highlighting of user choices in the on-screen displays.

The routine for automatic generation of the predictive list is set forth in FIGURE 5. The routine is entered at step 500, and at step 520, a search of the newly received program guide is performed for a match with search terms in the viewed item list of FIGURE 2. Note that the additional program descriptive data 120 of FIGURE 1 is also to be search for a correspondence with the search terms of FIGURE 2. The search routine loops at step 525 until completed. At step 530, the list is weighted for display. The list of items predicted to be of interest to the viewer is then displayed at step 535, and the program exited at step 540.

FIGURES 6a-6c show screen displays which enable the user to exercise the features of the invention. Specifically, FIGURE 6a is a Predictive Agent Main Menu screen accessed for example via the normal hierarchical menu system of the DSS® satellite television system. The screen display of FIGURE 6a has two "softkeys" labelled "Request a Suggestion" and "Edit User Information", respectively. Selecting "Request a Suggestion" causes a prediction operation to be performed, and brings up the screen display of FIGURE 6b. FIGURE 6b shows the predictions to the user, for example the movie Annie Hall on the Fox channel leads a list of shows predicted to be of interest to this particular viewer. The viewer may highlight one of the items on the list and then either tune to that show or record it. The other choice in the screen display of FIGURE 6a is "Edit User Information". Suppose the viewer had watched a show called (for purposes of this explanation) "Undesired Show". Further suppose that the viewer did not en-

joy the show and does not want that show to influence future predictions. By selecting the "Edit User Information" softkey, the screen of FIGURE 6c is brought up for display. The viewer may then highlight the entry for "Undesired Show" and delete it by pressing the "Delete Item" softkey. As noted above, the viewer may also lock a desired entry to keep it from being automatically deleted when space is needed, if that item has a low count, or hasn't been watched recently.

Although the invention was described with reference to a satellite television system, it is equally applicable to ground based television broadcast systems, both digital and analog.

#### Claims

1. In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide list, apparatus comprising:  
 memory means for storing data representing said channel guide list and for storing data representing a list of characteristics of television programs previously watched by a user;  
 data entry means for entering user-entered data;  
 control means for performing a search of said channel guide listing for a match to said data representing said characteristics of television programs previously watched by said user; and  
 on-screen display means for displaying text or graphics under control of said control means; upon successful conclusion of said search, said control means controls said on-screen display means to notify said user of an availability of a television program selected for sharing similar characteristics with entries of said list of characteristics of television programs previously watched by said user.
2. The apparatus of claim 1 wherein said characteristics of said list of characteristics of television programs previously watched by a user includes topic, title, date, or theme information.
3. The apparatus of claim 2 wherein said control means times a period beginning immediately after a user selects a television program, and if said period exceeds a predetermined amount of time, said control means modifies said list of characteristics of television programs previously watched by a user to reflect said television program selection.
4. The apparatus of claim 2 wherein, when television program-descriptive text accompanies said channel guide list, said control means performs a search

of said television program-descriptive text for a particular text string relating to title, star, director, theme, content advisory information, or content of said television program.

which may relate to title, star, director, or context of said television program.

- 5
5. The apparatus of claim 4 wherein, in response to user-entered data said control means controls said on-screen display means to display said list of characteristics, and said control means modifying said list of characteristics in response to user-entered data. 10
  6. The apparatus of claim 1 wherein, said control means notifies said user of said availability of said television program by producing a display of television programs comprising a list of television programs having similar characteristics to characteristics of a previously watched television program. 15
  7. The apparatus of claim 5 wherein, said on-screen display produced after successful completion of a search includes instructions to record said television program and instructions to notify the user of an availability of said television program, said instructions being selectable for execution by a user. 20 25
  8. The apparatus of claim 2 wherein, in response to user-entered data said control means controls said on-screen display means to display said list of characteristics, said list of characteristics including an indication of the number of times each program type was viewed. 30
  9. A television program searching method in a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide list, comprising the steps of: 35  
storing in a memory means data representing said channel guide list and storing data representing characteristics of television programs previously watched by said user; performing a search of said channel guide listing for a match to specific data representing said characteristics of television programs previously watched by said user; and upon successful conclusion of said search, notifying said user of an availability of said television program having similar characteristics to characteristics of a previously watched television program. 40 45 50
  10. The method of claim 8 wherein, when television program-descriptive text accompanies said channel guide list, includes the further step of: performing a search of said television program-descriptive text for a particular text string 55

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CH 150 Program Guide

7:05pm

CH 150		Program Guide		7:05pm	
				110	120
HBO 102	OTHER PEOPLE'S MONEY	CBS 106	EVENING NEWS	MOVIE TITLE: ZULU STARRING: STANLEY BAKER & MICHAEL CAINE PRODUCER: STANLEY BAKER RATING: PG-13 (VIOLENCE) THEME: ACTION/ADVENTURE REVIEW:  ★ ★ ★ 1/2	PLOT: A VASTLY OUTNUMBERED COMPANY OF BRITISH SOLDIERS IN LATE 19TH CENTURY SOUTH AFRICA DEFENDS AN ISOLATED OUTPOST AGAINST AN ATTACK BY 40,000 ZULU WARRIORS.
UPN 113	STAR TREK: VOYAG	FRA TUR			
CINE 210	CINE SATURDAY NIGHT MOVIE:	ZULU			
CNN 305	PRIME NEWS	BOTH SIDES	RELIABLE SOURCES	WORLD NEWS	
USA 422	COUNTER STRIKE		QUANTUM LEAP		
MORE	MOVIES	SPORTS	OTHER	ALL	EXIT

1  
Fig.

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210

NAME	COUNT	TYPE	DATE	LOCK
movie	7	topic	11.15.95	no
comedy	3	theme	11.15.95	no
drama	4	theme	09.27.95	no
The Simpsons	21	title	10.23.95	yes

Fig. 2

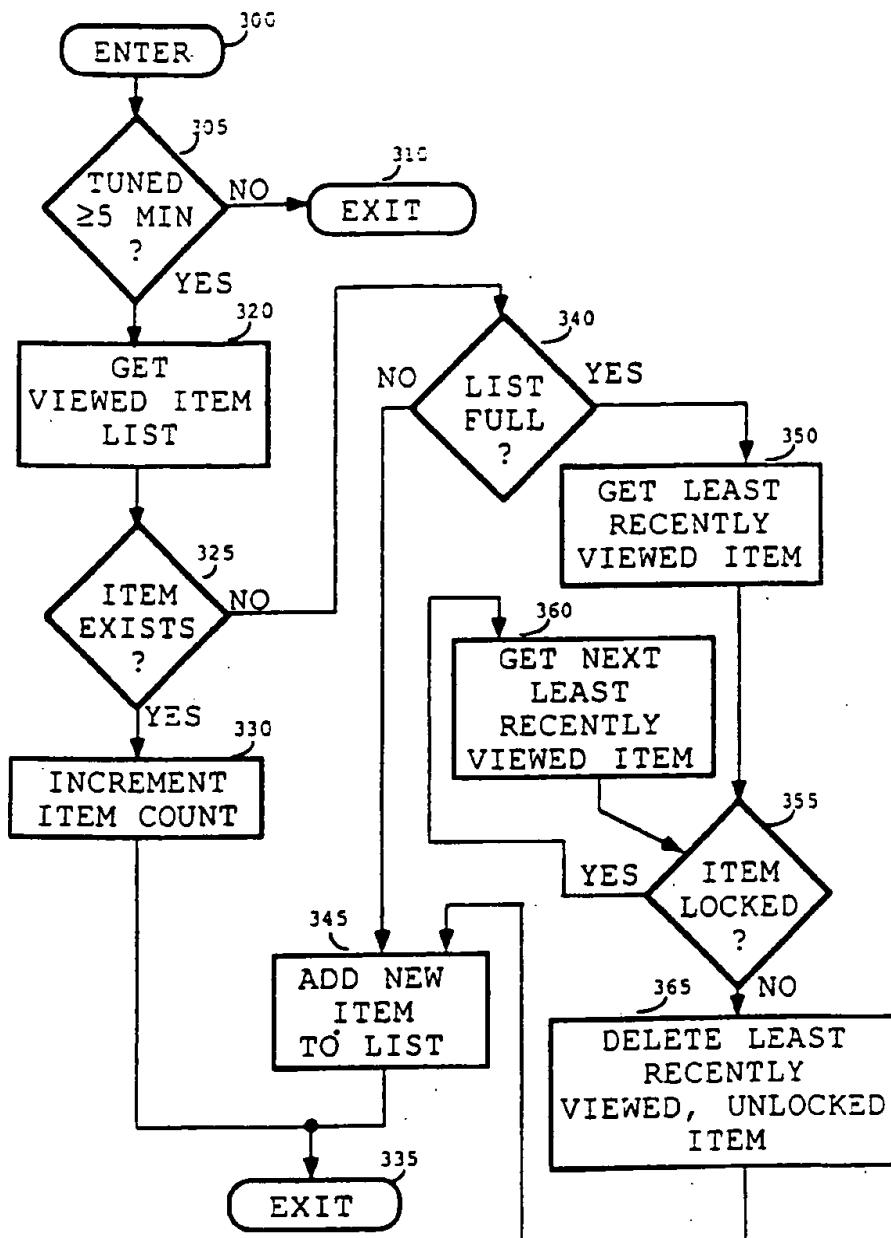


Fig. 3

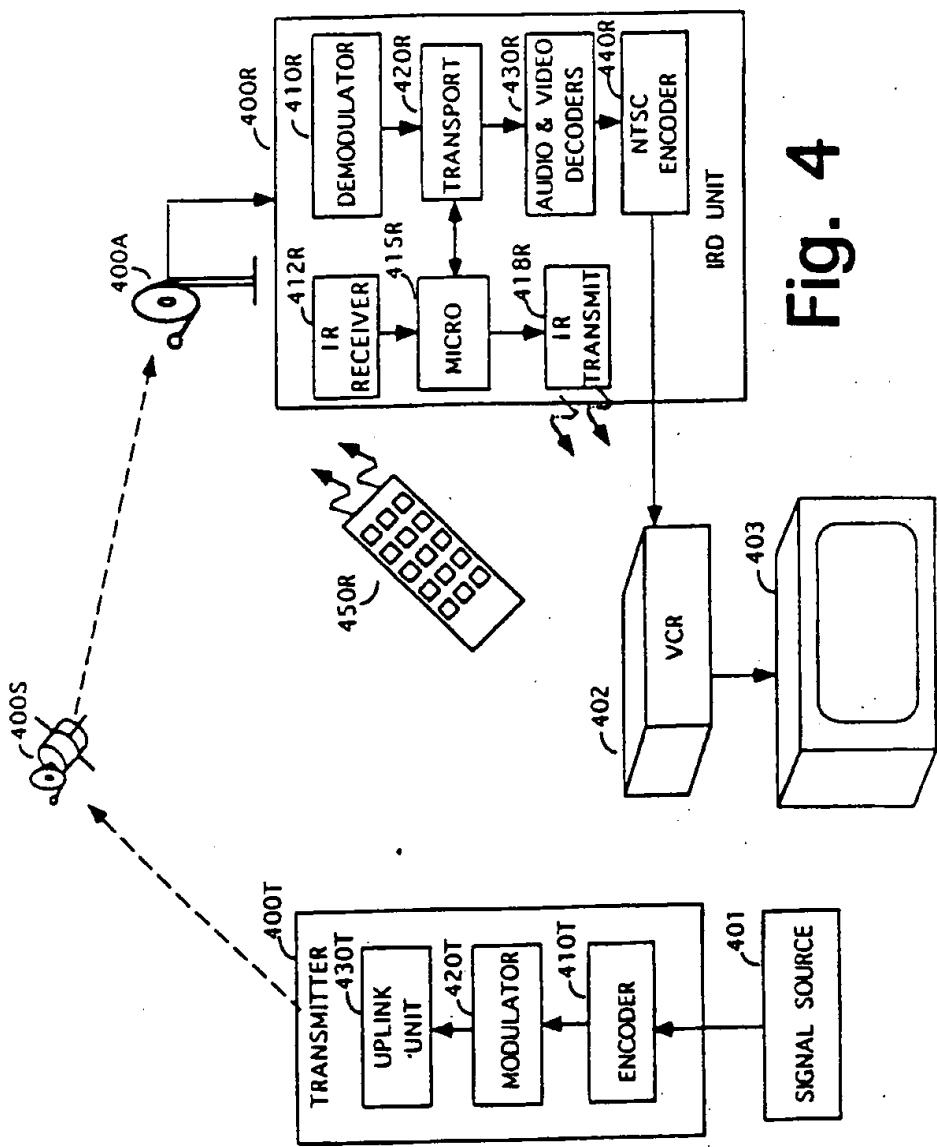


Fig. 4

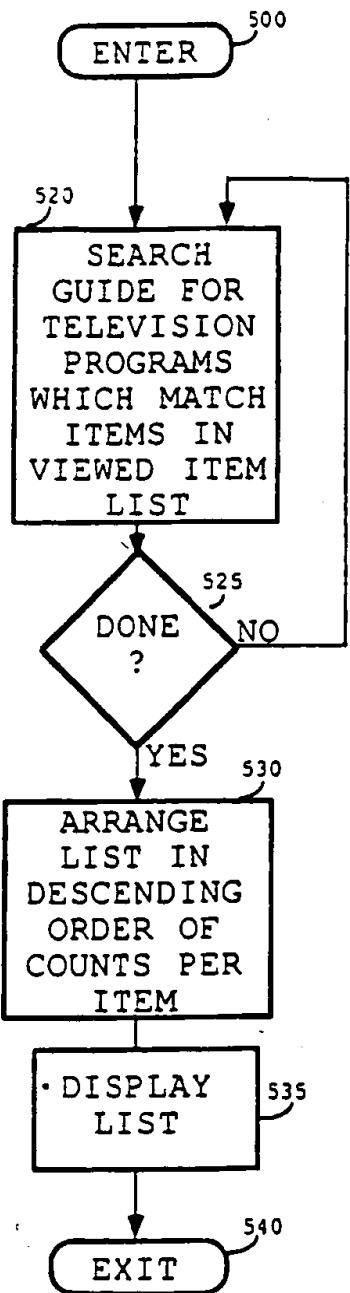


Fig. 5

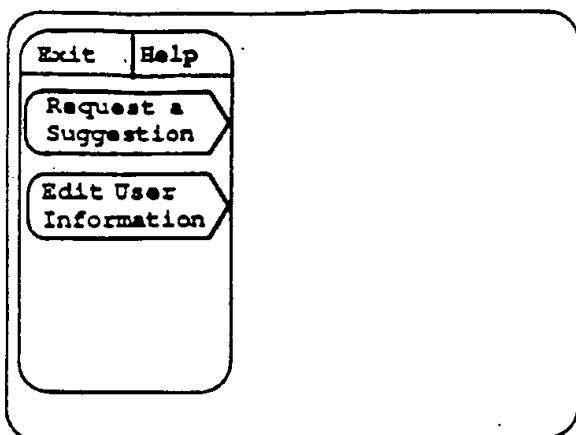


Fig. 6a

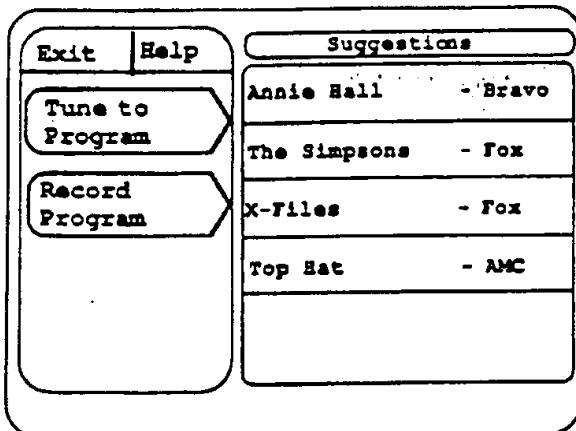


Fig. 6b

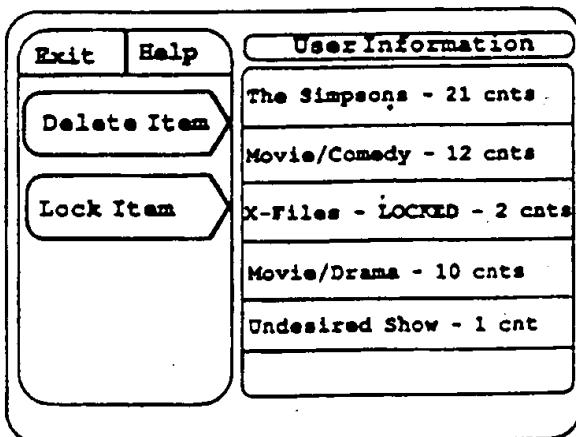


Fig. 6c

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(54) A scheduler apparatus employing a gopher for use in a television receiver

(57) In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide listing, apparatus is provided for searching the listing for specific user-entered information, and upon successful conclusion to the search, the apparatus schedules the tuning of the desired program, or in the alternative, notifies the viewer of the availability of the program. In those instances where descriptive text accompanies the program listing, apparatus of the invention performs a search of the text for a particular text string which may relate to the title, the star, the director, or the context of the program, among other search criteria.

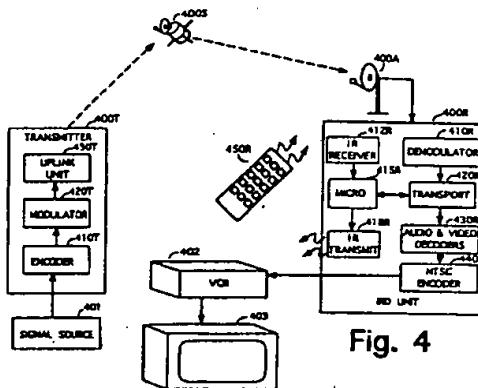


Fig. 4

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**Description**

The subject invention concerns apparatus for scheduling the selection of a television program for watching or recording at some future date.

The programming of modern television systems, such as TV schedulers, VCRs, and Satellite Receivers has become more complicated in that the number of available channels has increased dramatically of late. For example RCA® DSS® direct broadcast satellite receivers provide as many as 150 channels to choose from. Heretofore, a user who wanted to record a specific non-regularly scheduled television program such as the airing of a particular movie, would regularly consult a television schedule printed in his local newspaper in the hope that he would eventually find that movie listed.

Such a practice may work well when there are only a few television channel schedules to examine, however, it is unlikely that a viewer would be able to examine the complete schedules for 150 television channels each week. Such a task would be daunting even if all of the movies were to be listed separately, as some television program listings do. Consequently, it is felt that as the number of channels increases, the chances of successfully locating a single occurrence of a program (like a needle in a haystack) becomes more and more unlikely.

In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide listing, apparatus is provided for searching the listing for specific user-entered information, and upon successful conclusion to the search, the apparatus schedules the tuning of the desired program, or in the alternative, notifies the viewer of the availability of the program. In those instances where descriptive text accompanies the program listing, apparatus of the invention performs a search of the text for a particular text string which may relate to the title, the star, the director, or the context of the program, among other search criteria.

FIGURES 1a-1c are illustrations of a screen display of a portion of a channel guide, in accordance with one aspect of the invention.

FIGURE 2 is an illustration of a screen display showing a search request screen in accordance with another aspect of the invention.

FIGURE 3 is an illustration of a screen display of a portion of a channel guide showing auxiliary program information.

FIGURE 4 is an illustration in block diagram form of apparatus suitable for use with the invention.

FIGURE 5 is an illustration of a search request list in accordance with the subject invention.

FIGURE 6 is an illustration of a screen display useful for entering text search phrases in accordance with the invention.

FIGURE 7 is a flowchart useful in understanding the invention.

Television systems such as the RCA® DSS® direct broadcast satellite system and Starsight® transmit channel guides for display on the television receivers of subscribers.

- 5 FIGURES 1a-1c show Program Guide screen displays produced, for example, by an RCA® DSS® direct broadcast satellite receiver system, manufactured by Thomson Consumer Electronics, Inc. Indianapolis, IN. A user selects a television program from a Program Guide for viewing, by moving a cursor (via operation of remote control up, down, right, and left, direction control keys, not shown) to a block of the program guide screen display which contains the name of the desired program. When a SELECT key on the remote control is pressed, the current x and y position of the cursor is evaluated to derive virtual channel and program time information. In this example of FIGURE 1a, a particular television show, EVENING NEWS has been highlighted for selection by use of the cursor keys on a remote control unit (e. g., 450R of FIGURE 4). The highlighting is illustrated by the dark box outlining the title in FIGURES 1a-1c. Normally, upon pressing the select key, the relevant programming data is transferred to a programming unit.
  - 10
  - 15
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  - 45
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  - 55
- However, note the phrase "ENTER ALL OR PART OF A PROGRAM NAME TO SEARCH" which appears at the bottom of FIGURE 1a. In this case the word "HOME" has been entered by a user. Upon pressing the MENU key, a search of the channel guide information is performed for the next occurrence of a television program including the word "HOME" in its title. At the completion of the search, the screen display of FIGURE 1b is generated. Note that a television program on channel 106 entitled "HOME IMPROVEMENT" is now highlighted. If desired, a further search can be initiated by pressing the MENU key again. The result of that further search is shown in the screen display of FIGURE 1c. Note that in FIGURE 1c, a television program on channel 305, "HOME AND GARDEN" is highlighted, because that title includes the word "HOME", and thus satisfies the search criteria. The subject apparatus can also perform "substring searching" wherein the keyword (search term) is contained within another word. For example, a substring search on the word HOME would find the movie title "HOMeward BOUND". Similarly, the search can be made case sensitive, or case insensitive, as desired.
- FIGURE 2 shows a "GOPHER PROGRAM" screen display 210 useful for entering text to be searched, and for entering instructions to be executed in the event that the search is terminated. The search entered on screen display 210 will perform the logical "AND" function on the search terms "ZULU" (a movie title) and "MICHAEL CAINE" (one of ZULU's stars). While a logical "AND" function is shown, logical "OR" and "NOT" functions are also envisioned. In fact, a logical "OR" function could simply be performed by entering the search terms as two different searches. That is, if the search term "ZULU" were entered by itself, the movie "ZULU" AND

any television program concerning the ZULU tribe would be selected. If the search term "MICHAEL CAINE" were entered as a separate search, the movie "ZULU" and any other movie starring Michael Caine would be selected.

Note from screen display 210, that when the movie "ZULU" is found, it is to be recorded. That is, after entering the search terms and instructions via screen display 210, the user does not have to perform any further function (other than ensuring that the VCR has a tape in it) to secure a recording of the movie "ZULU" whenever it is aired. At the proper time the apparatus of the invention will transmit the record commands to the VCR, automatically. Alternatively, the user may have checked the box labelled DISPLAY A "PROGRAM LOCATED" MESSAGE, in which case the show will not be recorded, but rather a reminder will be displayed indicating that the search has successfully terminated upon finding the requested item.

FIGURE 3 shows a Program Guide screen 310, including an auxiliary information display 320. The text of auxiliary display 320 includes the search terms "ZULU" and "MICHAEL CAINE" in the program description. This text will be searched by the GOPHER PROGRAM and the search will come to a successful conclusion. Note that a search of "ZULU" and "STANLEY BAKER" would have been equally successful. It is important to note that not only is the Program Guide text, but also the auxiliary information associated with the television programs, is being searched.

As noted above, the channel guide data used by the controller of the subject apparatus to form the above-described interactive or confirmation sentences may be received from a satellite television communication system. FIGURE 4 shows such a satellite television communication system in which, a satellite 400S receives a signal representing audio, video, or data information from an earth-based transmitter 400T. The satellite amplifies and rebroadcasts this signal to a plurality of receivers 400R, located at the residences of consumers, via transponders operating at specified frequencies and having given bandwidths. Such a system includes an uplink transmitting portion (earth to satellite), an earth-orbiting satellite receiving and transmitting unit, and a downlink portion (satellite to earth) including a receiver located at the user's residence.

In such a satellite system, the information necessary to select a given television program is not fixedly-programmed into each receiver but rather is downloaded from the satellite continually on each transponder. The television program selection information comprises a set of data known as a Master Program Guide (MPG), which relates television program titles, their start and end times, a virtual channel number to be displayed to the user, and information allocating virtual channels to transponder frequencies and to a position in the time-multiplexed data stream transmitted by a particular transponder. In such a system, it is not possible to tune any channel until the first master program guide

is received from the satellite, because the receiver (IRD, or Integrated Receiver Decoder) literally does not know where any channel is located, in terms of frequency and position (i.e. data time slot) within the data stream of any transponder.

A master program guide is preferably transmitted on all transponders with the television program video and audio data, and is repeated periodically, for example, every 2 seconds. The master program guide, once received, is maintained in a memory unit in the receiver, and updated periodically, for example every 30 minutes. Retention of the master program guide allows instantaneous television program selection because the necessary selection data are always available. If the master program guide were to be discarded after using it to select a television program, then a delay of at least two seconds would be incurred while a new program guide was acquired, before any further television program selections could be performed.

Once the channel transponder carrying a desired television program is tuned, the data packets containing the audio and video information for that program can be selected from the data stream received from the transponder by examining the data packets for the proper SCID (Service Component Identifier) 12 bit code. If the SCID of the currently received data packet matches the SCID of the desired television program as listed in the program guide, then the data packet is routed to the proper data processing sections of the receiver. If the SCID of a particular packet does not match the SCID of the desired television program as listed in the program guide, then that data packet is discarded.

A brief description of system hardware, suitable for implementing the above-described invention, now follows. In FIGURE 4, a transmitter 400T processes a data signal from a source 401 (e.g., a television signal source) and transmits it to a satellite 400S which receives and rebroadcasts the signal to a receiving antenna 400A which applies the signal to a receiver 400R. Transmitter 400T includes an encoder 410T, a modulator (i.e., modulator/forward error corrector (FEC)) 420T, and an uplink unit 430T. Encoder 410T compresses and encodes signals from source 401 according to a predetermined standard such as MPEG. MPEG is an international standard developed by the Moving Picture Expert Group of the International Standards Organization for coded representation of moving pictures and associated audio stored on digital storage medium. An encoded signal from unit 410T is supplied to modulator/Forward Error Corrector (FEC) 420T, which encodes the signal with error correction data, and Quaternary Phase Shift Key (QPSK) modulates the encoded signal onto a carrier.

Uplink unit 430T transmits the compressed and encoded signal to satellite 400S, which broadcasts the signal to a selected geographic reception area. The signal from satellite 400S is received by an antenna dish 400A coupled to an input of a so-called set-top receiver 400R (i.e., an interface device situated atop a television

receiver). Receiver 400R includes a demodulator (demodulator/Forward Error Correction (FEC) decoder) 410R to demodulate the signal and to decode the error correction data, an IR receiver 412 for receiving IR remote control commands, a microprocessor 415R, which operates interactively with demodulator/FEC unit 410R, and a transport unit 420R to transport the signal to an appropriate decoder 430R within unit 400R depending on the content of the signal, i.e., audio or video information. An NTSC Encoder 440R encodes the decoded signal to a format suitable for use by signal processing circuits in a standard NTSC consumer VCR 402 and standard NTSC consumer television receiver 403. Microprocessor (or microcontroller, or microcomputer) 415R receives infrared (IR) control signals from remote control unit 450R, and sends control information to VCR 402 via an IR link 418R. Microprocessor 415R also generates the on-screen display (OSD) signals needed for presenting the interactive sentence, or confirmation sentence, to the user. Microprocessor 415R also receives and interprets cursor key X and Y information in order to control the highlighting of user choices in the on-screen displays.

FIGURE 5 shows a search request list which may be displayed as a screen display. In this embodiment of the invention, three actions are possible. First, as noted above, a show may be programmed to be recorded at its next airing without further intervention by the user. Second, as noted above, a reminder can be displayed on-screen that the desired program has been found. Third, a report listing various programs meeting the search criteria and airing in the immediate future (for example, the next three hours) can be prepared and displayed. In the example of FIGURE 5, the user has requested that he be reminded anytime an episode of Star Trek appears in the Program Guide. The user has also requested that the movie "The Shining" be recorded the next time it is found in the guide. The user has also requested that he be reminded anytime the word "robot" appears in the guide or in the program descriptions of the guide. These instructions will run until turned off by the user. The remaining search (i.e., movie, drama, now) is a request which indicates that the user wants to know which dramas are being aired in the immediate future (i.e., within the next three hours). The controller will prepare a report listing all dramatic movies on all channels which are being broadcast in the next few hours. After doing so, this entry will be automatically deleted. It is further envisioned that a user may review and edit or delete search terms in order to modify on-going searches.

FIGURE 6 shows a screen display of a "virtual keyboard" useful for entering search data. Four "Search Gophers" called "Watchdogs" are programmable for performing simultaneous searches of the Program Guide and auxiliary information data streams. By using the cursor and select keys, a user can "press" one of the watchdog buttons on the left of the screen to select it. He may then use the alphabet keys to enter his search request. (While not explicitly shown, alphanumeric keys

are also envisioned). When the user is satisfied with the text of his search request, he may press the Save key to save the search terms for this watchdog search process. If he makes an error, he may delete the error with the clear key.

The Gopher program is entered at step 700 of FIGURE 7. At step 705, the search terms are retrieved. At step 710, the Program Guide data is acquired. At step 715 a comparison is made to see if a match exists. If not the program is exited at step 720. If a match does exist, then the user-entered instructions are retrieved. A check is made at step 725 to determine if a record instruction has been entered, if so the routine advances to step 730 at which the record commands are transmitted to the VCR either immediately or at an appropriate later time. The routine is then exited at step 735. If however, a record instruction was not entered then the routine advances to step 740 at which a reminder message is generated for display, either immediately or at an appropriate later time as a "last minute reminder" before the desired show is broadcast, or both. The routine is then exited at step 735.

Although the invention was described with reference to a satellite television system, it is equally applicable to ground based television broadcast systems, both digital and analog.

#### Claims

1. In a television system in which at least program title information for programs which are to be transmitted in the future is transmitted in advance to form a channel guide list, apparatus comprising:
  - memory means for storing data representing said channel guide list and for storing user-entered data; data entry means for entering said user-entered data;
  - control means for performing a search of said channel guide listing for a match to specific user-entered information;
  - on-screen display means for displaying text or graphics under control of said control means; and
  - means for selecting a television program for viewing; and
  - upon successful conclusion of said search, said control means schedules a selection of said television program, or controls said on-screen display means to notify said user of an availability of said television program.
2. The apparatus of claim 1 wherein: when television program-descriptive text accompanies said channel guide list, said control means performs a search of said television program-descriptive text for a particular text string which may relate to title, star, director, or context of said television program.

3. The apparatus of claim 2 wherein: in response to user-entered data said control means controls said on-screen display means to display a list of user-entered search criteria, and user-entered instructions for execution after successful completion of each search. 5
4. The apparatus of claim 3 wherein: said on-screen user-entered instructions for execution after successful completion of each search include instructions to record said television program and instructions to notify the user of an availability of said television program. 10
5. The apparatus of claim 1 wherein: said control means notifies said user of said availability of said television program by modifying a portion of channel guide display relating to said program. 15
6. The apparatus of claim 1 further including a remote control unit wherein: said user-entered data is entered by means of a screen displayed keyboard operated by selecting keys of said keyboard via cursor commands transmitted by said remote control unit. 20 25
7. The apparatus of claim 1 wherein: said user-entered search criteria form logically-ORed search terms. 30
8. The apparatus of claim 1 wherein: said user-entered search criteria form logically-ANDed search terms.
9. The apparatus of claim 1 wherein: said user-entered search criteria form logical compound statements employing logic operators, such as AND, OR, NOT, or XOR to logically-connect search terms. 35

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CH 150 Program Guide					7:05pm
	7:00pm	7:30pm	8:00pm	8:30pm	
HBO 102	OTHER PEOPLE'S MONEY		FREE PREVIEW	DREAM ON	
CBS 106	EVENING NEWS	HOME IMPROVEMENT	BROOKLYN BRIDGE	RAVEN	
UPN 113	STAR TREK: VOYAGER		ENTERTAINMENT TONIGHT	WORLD NEWS	
CINE 210	EYEWITNESS	FUN CITY		DOUBLE TROUBLE	
CNN 305	PRIME NEWS	BOTH SIDES	RELIABLE SOURCES	HOME AND GARDEN	
USA 422	COUNTER STRIKE		QUANTUM LEAP		
<a href="#">MORE</a>		<a href="#">MOVIES</a>	<a href="#">SPORTS</a>	<a href="#">OTHER</a>	<a href="#">ALL</a>
<a href="#">EXIT</a>					
ENTER ALL OR PART OF PROGRAM NAME TO SEARCH: HOME					

Fig. 1a

CH 150 Program Guide					7:05pm
	7:00pm	7:30pm	8:00pm	8:30pm	
HBO 102	OTHER PEOPLE'S MONEY		FREE PREVIEW	DREAM ON	
CBS 106	EVENING NEWS	HOME IMPROVEMENT	BROOKLYN BRIDGE	RAVEN	
UPN 113	STAR TREK: VOYAGER		ENTERTAINMENT TONIGHT	WORLD NEWS	
CINE 210	EYEWITNESS	FUN CITY		DOUBLE TROUBLE	
CNN 305	PRIME NEWS	BOTH SIDES	RELIABLE SOURCES	HOME AND GARDEN	
USA 422	COUNTER STRIKE		QUANTUM LEAP		
<a href="#">MORE</a>		<a href="#">MOVIES</a>	<a href="#">SPORTS</a>	<a href="#">OTHER</a>	<a href="#">ALL</a>
<a href="#">EXIT</a>					
HOME FOUND. PRESS MENU AGAIN TO FIND ANOTHER OCCURRENCE					

Fig. 1b

CH 150 Program Guide					7:05pm
	7:00pm	7:30pm	8:00pm	8:30pm	
HBO 102	OTHER PEOPLE'S MONEY		FREE PREVIEW	DREAM ON	
CBS 106	EVENING NEWS	HOME IMPROVEMENT	BROOKLYN BRIDGE	RAVEN	
UPN 113	STAR TREK: VOYAGER		ENTERTAINMENT TONIGHT	WORLD NEWS	
CINE 210	EYEWITNESS	FUN CITY		DOUBLE TROUBLE	
CNN 305	PRIME NEWS	BOTH SIDES	RELIABLE SOURCES	HOME AND GARDEN	
USA 422	COUNTER STRIKE		QUANTUM LEAP		
<a href="#">MORE</a>		<a href="#">MOVIES</a>	<a href="#">SPORTS</a>	<a href="#">OTHER</a>	<a href="#">ALL</a>
<a href="#">EXIT</a>					
HOME FOUND. PRESS MENU AGAIN TO FIND ANOTHER OCCURRENCE					

Fig. 1c

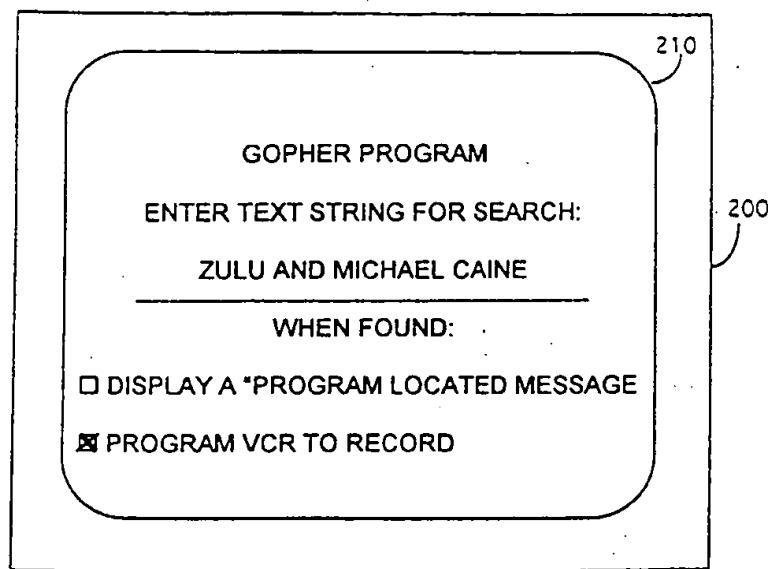


Fig. 2

EP 0 774 868 A1

CH 150		Program Guide		7:05pm
		7:00pm	OTHER PEOPLE'S MONEY	FRA TUR
HBO 102	7:00pm	STAR TREK: VOYAGE		
CBS 106	7:00pm	EVENING NEWS		
UPN 113	7:00pm	CINE SATURDAY NIGHT MOVIE:	ZULU	
CINE 210	7:00pm	PRIME NEWS	BOTH SIDES	RELIABLE SOURCES
CNN 305	7:00pm	COUNTER STRIKE		WORLD NEWS
USA 422	7:00pm			QUANTUM LEAP
MORE	7:05pm	MOVIES	SPORTS	OTHER
				ALL
				EXIT

**Fig. 3**

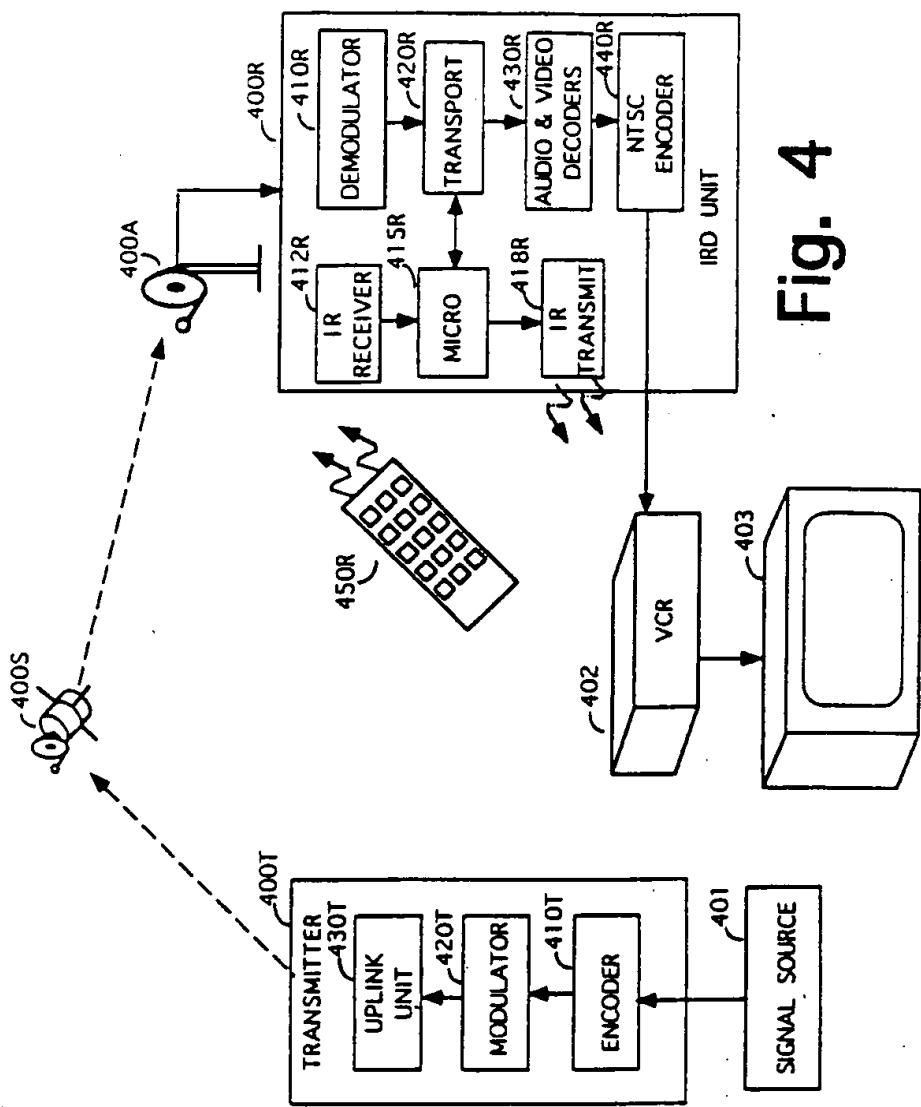


Fig. 4

TITLE	TOPIC	THEME	KEYWORD	ACTION	TIME
Star Trek				remind	always
The Shining				record	always
	movie	drama		report	now
			robot	remind	always

Fig. 5

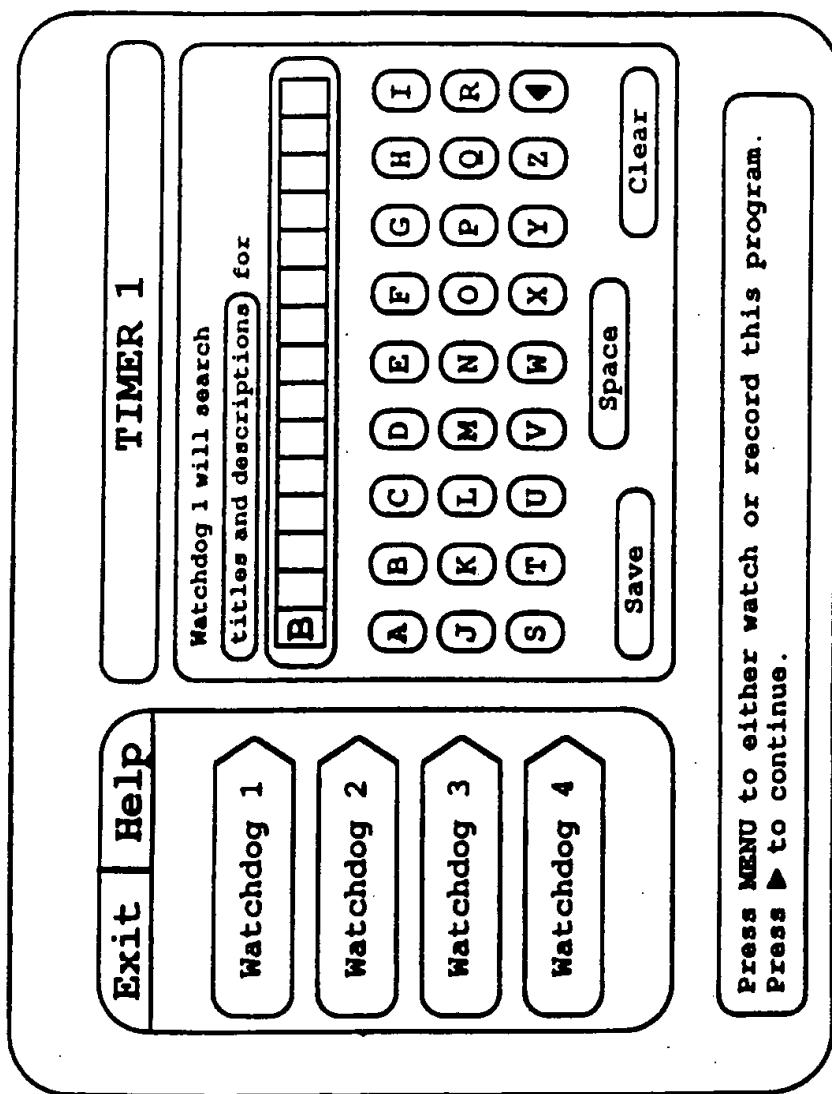


Fig. 6

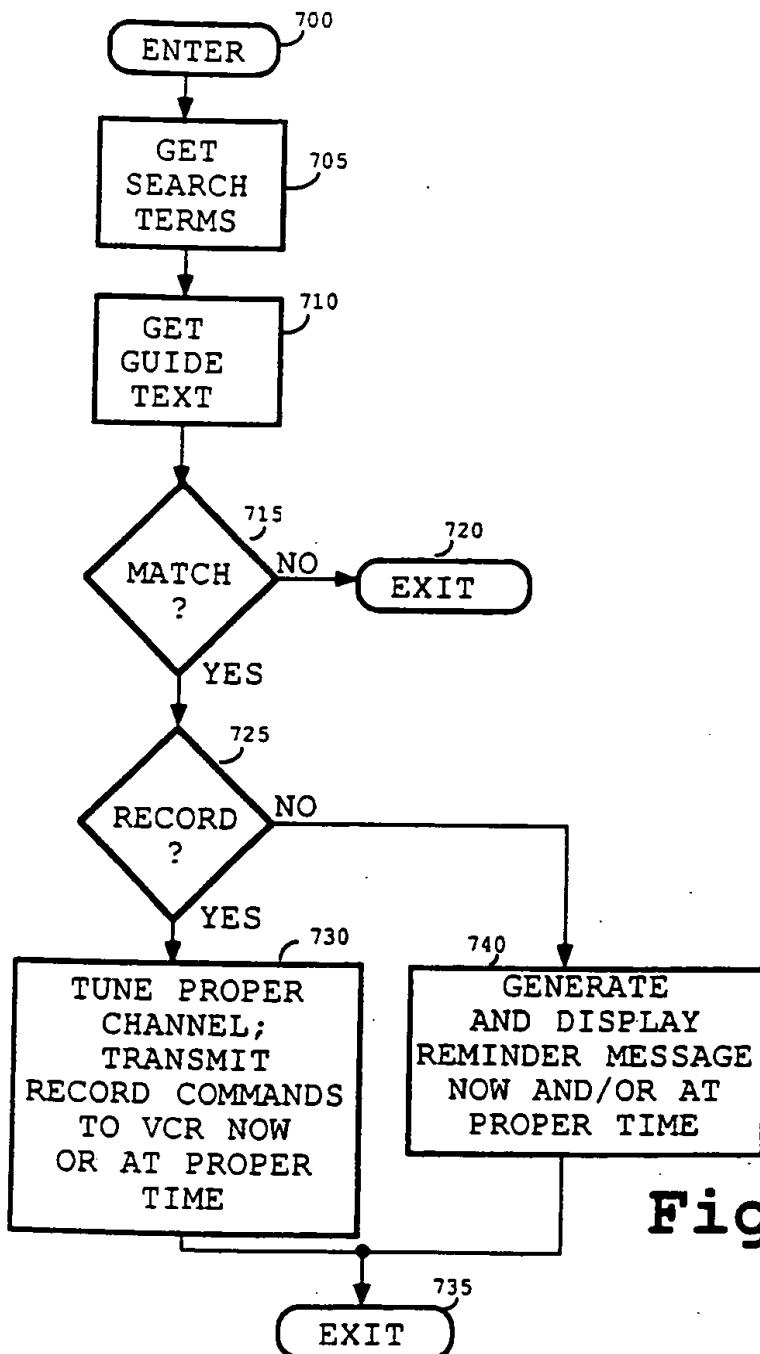


Fig. 7



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 96 11 7991

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC6)						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
X	WO 94 14282 A (DISCOVERY COMMUNICATIONS INC) 23 June 1994 * page 13, line 14 - page 15, line 2 * * page 26, line 17 - page 28, line 18 * * page 29, line 10 - page 34, line 18 * * page 41, line 18 - line 30 * * figures 5,8-26 * ---	1-6	H04N7/173 H04N5/445						
X	WO 93 22877 A (ICTV INC) 11 November 1993 * page 29, line 28 - page 34, line 34 * * figures 26-41 *	1-6							
X	PROCEEDINGS FROM ELEVEN TECHNICAL SESSIONS OF THE ANNUAL CONVENTION AND EXPOSITION OF THE NATIONAL CABLE TELEVISION ASSOCIATION, SAN FRANCISCO, JUNE 6 - 9. 1993, no. CONVENTION 42, 6 June 1993, RUTKOWSKI K, pages 223-236, XP000410503 BESTLER C: "FLEXIBLE DATA STRUCTURES AND INTERFACE RITUALS FOR RAPID DEVELOPMENT OF OSD APPLICATIONS" * page 223, left-hand column, line 1 - page 226, right-hand column, line 30 * -----	1-5	TECHNICAL FIELDS SEARCHED (IPC6) H04N						
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of compilation of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>18 February 1997</td> <td>Van der Zaal, R</td> </tr> </table>			Place of search	Date of compilation of the search	Examiner	THE HAGUE	18 February 1997	Van der Zaal, R	
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THE HAGUE	18 February 1997	Van der Zaal, R							
<b>CATEGORY OF CITED DOCUMENTS</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document </td> <td style="width: 33%; vertical-align: top;"> T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons </td> <td style="width: 34%; vertical-align: top;"> A : member of the same patent family, corresponding document </td> </tr> </table>				X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons	A : member of the same patent family, corresponding document			
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